

number of riders has been included to test the student's grasp of the theory.

(6) The treatment in this volume is practical rather than mathematical, and is designed for the use of those taking a course in mechanical drawing. Elementary in character, it provides a thorough introductory account of the subject. The first chapter considers in great detail the nature and meaning of orthographic projection, using three planes of reference. Next an account is given of the projection of a straight line and the method of obtaining the true length of a line in space. After this follow successively the treatment of the intersection of planes, curved lines, and surfaces, and the traces of lines and planes with various applications, and the book closes with a description of isometric projection. The excellence of the diagrams is a feature which calls for special remark. The explanations are clearly put, and the work is so arranged that no special mathematical ability is required.

(7) The absence of spherical trigonometry from the ordinary school syllabus is both surprising and unfortunate in view of the practical applications which may be made; nor can this omission be excused on the score of difficulty, since the analysis is scarcely more difficult than that of the corresponding work in plane trigonometry. The explanation, of course, lies in the fact that it is at present excluded from the schedule for university scholarships. The book before us contains in a rather unduly elaborate form the kind of course which might be incorporated in a school programme. After a preliminary discussion on spherical triangles, the methods for solving right-angled triangles are first explained, and then the general case of oblique-angled triangles is considered. Great care is taken to explain the best way of arranging the work in numerical examples. The concluding chapters of the book give applications to geometry, astronomy, and navigation. Theory is throughout subordinated to practice, and those who require a comprehensive working knowledge of the methods of this subject cannot do better than read through this book.

#### OUR BOOK SHELF.

*L'Évolution de l'Électrochimie.* By Prof. W. Ostwald. Translated by E. Philippi. Pp. 266. (Nouvelle Collection scientifique: directeur, Émile Borel.) (Paris: Félix Alcan, 1912.) Price 3.50 francs.

THE evolution of electrochemistry affords probably one of the most interesting chapters in the history of the progress of chemical knowledge. Since the birth of this branch of chemistry may be regarded as dating from the discovery of so-called voltaic electricity, the period covered by its history is limited to a little more than a century. The comparative shortness of this period has certain obvious advantages, and the many discoveries of fundamental importance made by investigators in the field of electrochemistry, as well as the development of theoretical knowledge relating to the nature of and connection between electrical and chemical energy afford particularly attractive material for an historical study.

The account presented by Prof. Ostwald, who may be legitimately regarded as the greatest authority on the subject, is admirable in every way, and a more

fascinating description of the development of a branch of science cannot well be imagined. The subject-matter and mode of treatment is indicated sufficiently by the titles of the sections into which the text is divided, viz.: (1) introduction; (2) prehistory; (3) Galvani and Volta; (4) Ritter and Davy; (5) from Faraday and Daniell to Hittorf and Kohlrausch; (6) electro-motive forces; (7) the beginning of technical electro-chemistry; (8) van 't Hoff and Arrhenius; (9) the ionists; (10) modern electrochemical industry; (11) the electron. In this final chapter a very brief but well-written account is given of the results attained in the investigation of the conductivity and the ionisation of gases, which results have given so much impetus to the development of the electron theory.

Much of the material collected and condensed in this little volume is to be found in Ostwald's compendious treatise on "Elektrochemie," published in 1896. This book, largely on account of its size, is comparatively little known amongst students of physical chemistry, and the appearance of a smaller work is therefore in itself an event of some importance.

*The Life and Love of the Insect.* By J. H. Fabre. Translated by A. T. de Mattos. Pp. x+262. (London: A. and C. Black, 1911.) Price 5s. net.

SEVERAL translators have already drawn from the abundant well of Fabre's entomological studies, and the volume before us is a pleasant addition. We like the grateful tribute to the veteran which the preface pays, and the quotation from Maeterlinck in regard to this "Insects' Homer," "who is one of the most profound and inventive scholars and also one of the purest writers, and, I was going to add, one of the finest poets of the century that is just past."

The book tells us of the sacred scarabee supremely inspired by the instinct of maternity to wonderful industry and not less wonderful art; of the Spanish Copris which kneads a large loaf and divides it into pills, one for each egg; of the common dung-beetles (*Geotrupes*), who belong to the public health service, and are often deservedly decorated; of *Minotaurus typhaeus*, a black beetle of the sheep's pasture, who burrows and bakes, and even makes sausages; of the ringed Calicurgus, which first stings its captured spider in the mouth, paralysing the poison fangs, and then, safe from being bitten, drives in its poisoned needle with perfect precision at the thinnest part of the spider's cuticle between the fourth pair of legs; of the leaf-rolling Rhynchites, which spends the whole day in making an inch-long cigar with eggs between the layers of the scroll; and of the mother of the Halictus bee family, who becomes in her old age the portress of the establishment, shutting the door with her bald head when strangers arrive, opening it by drawing aside when any member of the household appears on the scene. And so the stories run, full of dramatic situations and romantic interest. We know not which to admire the more, Fabre's style or his eyes. The translator has given us a fine rendering, which reads like the original.

(1) *Aids to Bacteriology.* By C. G. Moor and Wm. Partridge. Second edition. Pp. viii+240. (London: Baillière, Tindall, and Cox, 1911.) Price 3s. 6d. net. Paper, 3s.

(2) *Aids to Pathology.* By Dr. H. Campbell. Second edition. Pp. viii+228. (London: Baillière, Tindall, and Cox, 1911.) Price 3s. 6d. net.

THESE two little books contain a large amount of information in a small space. Neither professes to be more than an outline of the subject of which it treats, but both seem to be successful in their aim—that of acting as epitomes for the student and practitioner.

(1) The bacteriology treats of bacteriological methods, pathogenic bacteriology, and bacteriology as applied in hygiene in the examination of water, milk, foods, disinfectants, &c. A few slips need correcting—e.g. the statement that an antibody consists of two parts (p. 19)—and the Wassermann reaction needs amplifying somewhat; otherwise there is little to criticise, and some portions of the book are particularly good, e.g. the section on disinfectants.

(2) The pathology suffers somewhat from the attempt to include everything in so small a book—e.g. diseases of the teeth and parasitic worms—and other more important and fundamental processes are in consequence too briefly discussed. Fatty infiltration and degeneration are treated as though they are quite distinct. It is stated that active immunity is conferred by the injection of an anti-serum, whereas it is correctly stated a couple of lines later that this procedure confers a passive immunity. The diagrams indicating the interaction that occurs in the Wassermann reaction should render this subject clear.

R. T. H.

*Senior Chemistry.* By Dr. G. H. Bailey and H. W. Bausor. Pp. viii+509. Price 4s. 6d.

*Senior Magnetism and Electricity.* By Drs. R. H. Jude and J. Satterly. Pp. viii+446. Price 5s.

*Senior Heat.* By Drs. R. W. Stewart and J. Satterly. Pp. viii+300. Price 3s.

(London: W. B. Clive, University Tutorial Press, Ltd., 1911.)

All these books are based upon previous volumes issued by the same publishers. The first is an adaptation apparently of Dr. Bailey's "Chemistry for Matriculation," which was reviewed in our issue of May 11, 1911 (vol. lxxxvi., p. 345); the second of Dr. Jude's "Matriculation Magnetism and Electricity," noticed in these columns on June 23, 1910 (vol. lxxxiii., p. 485), and the third of the late Dr. Stewart's book on heat, noticed at the same time as the volume on magnetism and electricity referred to.

It would seem that the present volumes cover those parts of the respective subjects included in the syllabuses for candidates presenting themselves at the Senior Local Examinations conducted by the University of Cambridge.

*Fifty Useful Metric Equivalent Tables.* (London: The Central Translations Institute, n.d.) Price 6d. net.

PROVISION is made in these tables for the range of equivalents likely to arise in commercial dealings between this country and others using the metric system. The calculations are based upon figures supplied by the Board of Trade. The price equivalents deal with feet, yards, square feet, square yards, cubic feet, gallons, pounds avoirdupois, hundredweights, and forty cubic feet measurements—which are useful for checking freight charges. The prices are calculated at the rate of exchange of 25.22 francs to the £.

*A Handbook of Physics and Chemistry.* By H. E. Corbin and A. M. Stewart. Pp. viii+519. Fourth edition. (London: J. and A. Churchill, 1911.) Price 7s. 6d. net.

The first edition of this book was reviewed in NATURE of January 4, 1900 (vol. lxi., p. 221). It will suffice to say that in its present form the volume covers the extended syllabus of work required for the first examination of the Conjoint Examining Board of the Royal Colleges of Physicians and Surgeons. Additional articles have been introduced in the present edition on hydrostatics, the polarisation of light, and Röntgen rays.

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#### LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

#### Electricity and Vegetation.

WITHOUT pretending to answer the question raised by Mr. Benham at the conclusion of his letter on p. 41 of NATURE of November 9, and without prejudging the results of recent experience on electrification of crops as reported on by Dr. Priestley and other impartial investigators, I would remind him and your readers generally that it is unsafe to attach a positive conclusion to a negative result obtained by supposed electrification of a wire network over a field, unless there is reasonable guarantee that such network was really kept positively electrified during considerable periods.

For instance, it has been attempted in the past, and it is still tempting, to supply electricity to a network by means of elevated spikes, arranged so as to utilise the gradient of potential naturally existing in the atmosphere. But think what singularly perfect insulation would be required to enable electricity slowly supplied in this way to accumulate until a fizzing point was reached. The attainment of such potential over a large area would in this climate be quite impracticable except when a thundercloud was passing overhead.

The same difficulty of adequate insulation must have militated against many attempts made in the past to supply electricity from artificial but old-fashioned high-potential sources, especially when the area to be supplied extended over many acres.

It must be further remembered that any metallic network not really charged, but kept practically at zero potential by leakage to earth, would be presumably detrimental to the growth of plants beneath it; inasmuch as it would tend to screen them from the natural inductive electrification to which they are entitled.

OLIVER LODGE.

#### Fish and Drought.

THE summer of the year 1911 will long be remembered for its excessive heat and dryness. These were especially trying to the inhabitants of streams and shallow lakes or ponds. I had the opportunity of studying a remarkable instance of this, which I think is worth recording.

The Château de Marchais, with its magnificent domain, the property of the Prince of Monaco, lies about 16 kilometres east of Laon, in the department of Aisne, and is well known as one of the best shooting estates in France. The sketch (Fig. 1) represents the park. It occupies a rectangle surrounded by a ditch or moat, A, B, C, D, consisting of four canals, each 1250 metres long and 16 metres wide, and carrying usually a depth of 1½ metres of water. These canals form a continuous sheet of water, 5 kilometres long, and there is a bridge, a, b, c, d, over each of them. The country, though well-wooded, is flat and peaty, and the level of the water in the ditch is that of the water in the ground all round it. Like the ground-water, it is subject to rise and fall according to the wetness or dryness of the season.

When I arrived on the morning of September 29, I observed that the ditch was quite dry, with the exception of the small tank or enclosure (f) for ducks at the lodge known as the Porte Rouge, where entry to the park is obtained over the bridge marked (b). Yet the water of the ditch is always full of fish, principally carp, tench, perch, and pike. Now there was nothing but dry mud. *With the water the fish had entirely disappeared, and without leaving a single dead one to mark where they had before abounded.*

On the evening of September 29 a violent storm of wind and rain broke, and it raged over the whole of northern Europe until October 1. I was curious to see the effect which this first important rain, which marked the breaking of the drought, would have on the ditch.

It is right to say that the full significance of the dryness of the ditch and the absence of dead fish had not sufficiently impressed me. I only felt that I was witnessing a